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Remarks

The Office Action mailed July 1, 2003 has been carefully reviewed and the following remarks are made in consequence thereof.

Claims 1-3 and 5-52 are now pending in this application. Claim 4 has been canceled without prejudice, waiver, or disclaimer. Claims 1, 2, 27, 28, 50, and 51 are rejected. Claims 3-6, 29, and 52 are objected to as being dependent upon a rejected base claim, but are indicated as allowable if rewritten in independent form including all of the limitation(s) of the base claim and any intervening claims. Applicants wish to thank the Examiner for allowing the claims objected to, if the claims are rewritten in independent form. Claims 7-26 and 30-49 are allowed. Claims 1, 3, 27, and 50 have been amended. No new matter has been added.

The rejection of Claims 1, 2, 27 and 28 under 35 U.S.C. § 102(b) as being anticipated by Van Landingham (U.S. Patent 4,300,081) is respectfully traversed.

Van Landingham describes a motor voltage feedback stabilization for a pulse-width-modulated DC servo motor control system (column 1, lines 5-7). A plurality of terminals (34 and 35) of a servo motor (10) are connected as an input to an averaging circuit (58), an output of which represents an average voltage appearing across the servo motor over one or more pulse repetition periods (column 3, lines 38-41). An output of the averaging circuit is connected to potentiometer (60), and a potentiometer tap (61) picks off a signal of suitable level for connection to a terminal (62) (column 3, lines 47-49). A signal generator (64) develops a zero DC voltage level triangular wave signal as indicated by a waveform (66) (column 3, lines 50-51). This signal is applied to the terminal, and the terminal is connected to a summing junction operational amplifier (70) so that the output of the amplifier is a triangular wave having a DC voltage component indicative of the instantaneous motor energization required to reduce an error signal at a conductor (50) to zero in a stable manner (column 3, lines 52-57). A plurality of

resistors (76-79) are of suitable magnitude to obtain the proper gain for the amplifier (column 3, line 58). An output of the amplifier is applied as an input to a pair of comparators (74 and 75) for the purpose of developing pulse-width-modulation energization pulses for a plurality of transistors (36, 38) (column 3, lines 59-63).

Claim 1 has been amended to include the recitations of Claim 4, which is objected to as being dependent upon a rejected base claim, but containing allowable subject matter. For the reasons set forth above, Claim 1 is submitted to be patentable over Van Landingham.

Claim 2 depends from independent Claim 1. When the recitations of Claim 2 are considered in combination with the recitations of Claim 1, Applicants submit that dependent Claim 2 likewise is patentable over Van Landingham.

Claim 27 recites a motor including "a housing; a stator mounted in said housing, said stator comprising a stator bore; a rotor rotatably mounted at least partially within said stator bore; and a processor electrically connected to at least one of said stator and said rotor, said processor configured to: determine a load voltage; and set an average speed of the motor by superimposing sweep frequencies onto an average pulse-width frequency, the average pulse-width frequency being a predetermined average of the sweep frequencies."

Van Landingham does not describe or suggest a motor including a housing, a stator mounted in said housing, the stator including a stator bore, a rotor rotatably mounted at least partially within the stator bore, and a processor electrically connected to at least one of the stator and the rotor, the processor configured to determine a load voltage, and set an average speed of the motor by superimposing sweep frequencies onto an average pulse-width frequency, the average pulse-width frequency being a predetermined average of the sweep frequencies.

Moreover, Van Landingham does not describe or suggest a motor including a processor configured to set an average speed of the motor by superimposing sweep frequencies onto an average pulse-width frequency, the average pulse-width frequency being a predetermined average of the sweep frequencies. Rather, Van Landingham describes that the output of the amplifier is applied as an input to a pair of comparators for the purpose of developing pulse-width-modulation energization pulses for transistors. For the reasons set forth above, Claim 27 is submitted to be patentable over Van Landingham.

Claim 28 depends from independent Claim 27. When the recitations of Claim 28 are considered in combination with the recitations of Claim 27, Applicants submit that Claim 28 likewise is patentable over Van Landingham.

For the reasons set forth above, Applicants respectfully request that the Section 102 rejection of Claims 1, 2, 27, and 28 be withdrawn.

The rejection of Claims 1, 2, 27, and 28 under 35 U.S.C. § 102(b) as being anticipated by Sakoh (U.S. Patent 5,268,987) is respectfully traversed.

Sakoh describes a speed control device for a DC motor. The speed control device includes a power supply voltage (V_0) that is applied to a DC motor (M) when a switch element (Q1) is turned on (column 1, lines 24-26). A voltage (Vc) corresponding to a back electromotive force is produced in the DC motor when the switch element is turned off (column 1, lines 26-29). An output voltage (V2) is subtracted from a set voltage (V3) and the subtracted voltage is amplified by an amplifying circuit (4) to obtain a voltage (V4) which becomes lower as the rotational speed of the DC motor increases and which becomes higher as the rotational speed decreases (column 1, lines 52-57). The amplified voltage V4 is compared with a non-constant voltage (V5) by a comparator circuit (6) (column 1, lines 57-59). As shown in Figure 10(d), the

non-constant voltage V5 changes its value at a predetermined frequency which provides a basis of a duty cycle of the switch element (column 1, lines 59-62). The comparator circuit outputs the first level of a control pulse signal (V6) to turn on the switch element when the amplified voltage V4, which becomes higher as the rotational speed of the DC motor decreases, exceeds the non-constant voltage V5 (column 1, lines 62-66). As the rotational speed of the DC motor decreases or the amplified voltage V4 becomes higher, the period during the amplified voltage V4 exceeds the non-constant voltage V5 becomes longer, so that the period during the switch element is kept on becomes longer (column 1, line 66 - column 2, line 4, and Figure 10(d)). As a result of this, the duty cycle for driving the DC motor is increased to compensate for the low speed rotation of the DC motor M or to increase the rotational speed of the DC motor (column 2, lines 4-8). On the other hand, if the rotational speed of the DC motor becomes higher, the duty cycle is decreased to reduce the rotational speed of the motor (column 2, lines 8-12).

Claim 1 has been amended to include the recitations of Claim 4, which is objected to as being dependent upon a rejected base claim, but containing allowable subject matter. For the reasons set forth above, Claim 1 is submitted to be patentable over Sakoh.

Claim 2 depends from independent Claim 1. When the recitations of Claim 2 are considered in combination with the recitations of Claim 1, Applicants submit that Claim 2 likewise is patentable over Sakoh.

Claim 27 recites a motor including "a housing; a stator mounted in said housing, said stator comprising a stator bore; a rotor rotatably mounted at least partially within said stator bore; and a processor electrically connected to at least one of said stator and said rotor, said processor configured to: determine a load voltage; and set an average speed of the motor by superimposing sweep frequencies onto an average pulse-width frequency, the average pulse-width frequency being a predetermined average of the sweep frequencies".

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Sakoh does not describe or suggest a motor including a housing, a stator mounted in said housing, the stator including a stator bore, a rotor rotatably mounted at least partially within the stator bore, and a processor electrically connected to at least one of the stator and the rotor, the processor configured to determine a load voltage, and set an average speed of the motor by superimposing sweep frequencies onto an average pulse-width frequency, the average pulse-width frequency being a predetermined average of the sweep frequencies.

Moreover, Sakoh does not describe or suggest a motor including a processor configured to set an average speed of the motor by superimposing sweep frequencies onto an average pulse-width frequency, the average pulse-width frequency being a predetermined average of the sweep frequencies. Rather, Sakoh describes that the duty cycle for driving the DC motor is increased to compensate for the low speed rotation of the DC motor M or to increase the rotational speed of the DC motor. For the reasons set forth above, Claim 27 is submitted to be patentable over Sakoh.

Claim 28 depends from independent Claim 27. When the recitations of Claim 28 are considered in combination with the recitations of Claim 27, Applicants submit that Claim 28 likewise is patentable over Sakoh.

For the reasons set forth above, Applicants respectfully request that the Section 102 rejection of Claims 1, 2, 27, and 28 be withdrawn.

The rejection of Claims 50 and 51 under 35 U.S.C. § 103(a) as being unpatentable over Sakoh is respectfully traversed.

Sakoh is described above.

Claim 50 recites a refrigerator including "a housing; a freezer section at least partially within said housing; a fresh food section at least partially within said housing; a motor at least partially within said housing; and a processor electrically connected to said motor, said processor configured to: determine a load voltage; and set an average speed of the motor by superimposing sweep frequencies onto an average pulse-width frequency, the average pulse-width frequency being a predetermined average of the sweep frequencies".

Sakoh does not describe or suggest a processor configured to set an average speed of the motor by superimposing sweep frequencies onto an average pulse-width frequency, the average pulse-width frequency being a predetermined average of the sweep frequencies. Rather, Sakoh describes that the duty cycle for driving the DC motor is increased to compensate for the low speed rotation of the DC motor M or to increase the rotational speed of the DC motor. For the reasons set forth above, Claim 50 is submitted to be patentable over Sakoh.

Claim 51 depends from independent Claim 50. When the recitations of Claim 51 are considered in combination with the recitations of Claim 50, Applicants submit that Claim 51 likewise is patentable over Sakoh.

For at least the reasons set forth above, Applicants respectfully request that the Section 103 rejection of Claims 50 and 51 be withdrawn.

The rejection of Claims 27 and 28 under 35 U.S.C. § 102(b) as being anticipated by Mourad et al. (U.S. Patent No. 6,236,175 B1) is respectfully traversed.

It appears that Mourad et al. is a 35 U.S.C. § 102(e) reference since Mourad et al. was not patented more than one year prior to the filing date, November 14, 2001, of the present application for patent in the United States. Accordingly, Applicants have treated Mourad et al. as a 102(e) reference.

Mourad et al. describe a process for detecting the speed of rotation of a DC electric motor (1) (column 1, lines 6-9). On the basis of a required nominal speed of rotation of the motor, indicated by a signal provided at an input (8a), an electronic unit (8) provides a driver circuit (7) with control signals acting to make a duty cycle of the signal applied to a gate of an electronic switch (5) correspond to a desired speed (column 2, lines 61-65). A voltage (V_0) between a drain of the electronic switch and ground has a qualitative variation illustrated in a left hand part of an upper graph of FIG.2 (column 2, line 66 — column 3, line 1). The voltage (V_0) has a square wave variation between a maximum value substantially corresponding to a voltage (V_B) delivered from a source (4), and a substantially nil value (column 3, lines 1-6). The electronic unit is set up to detect periodically the effective speed of rotation of the motor by periodically interrupting the application of the PWM control signal to the gate of the electronic switch (column 3, lines 7 - 10). Upon the occurrence of such an interruption, as illustrated by way of an example at instant (t_1) in FIG.2, the voltage (V_0) initially has a transient variation with a modest over voltage peak substantially equal to the forward conduction voltage of the recirculation diode 6, followed by a descent to a level which is on average lower than a voltage VB (column 3, lines 10-17). Once this initial transient has decayed, and whilst the application of the control signal to the input of the switch remains interrupted during a time interval between t_2 and t_3 in FIG.2, the voltage V_0 has an average value equal to the difference between the voltage VB delivered by the source (4) and an electromotive force (EMF) developed across a winding (2) of the electric motor (column 3, lines 17-23).

Claim 27 recites a motor including "a housing; a stator mounted in said housing, said stator comprising a stator bore; a rotor rotatably mounted at least partially within said stator bore; and a processor electrically connected to at least one of said stator and said rotor, said processor configured to: determine a load voltage; and set an average speed of the motor by

superimposing sweep frequencies onto an average pulse-width frequency, the average pulse-width frequency being a predetermined average of the sweep frequencies".

Mourad et al. does not describe or suggest a motor including a housing, a stator mounted in said housing, the stator including a stator bore, a rotor rotatably mounted at least partially within the stator bore, and a processor electrically connected to at least one of the stator and the rotor, the processor configured to determine a load voltage, and set an average speed of the motor by superimposing sweep frequencies onto an average pulse-width frequency, the average pulse-width frequency being a predetermined average of the sweep frequencies.

Moreover, Mourad et al. does not describe or suggest a motor including a processor configured to set an average speed of the motor by superimposing sweep frequencies onto an average pulse-width frequency, the average pulse-width frequency being a predetermined average of the sweep frequencies. Rather, Mourad et al. describe that the voltage V_0 has an average value equal to the difference between the voltage V_B delivered by the source and an electromotive force developed across the winding of the electric motor. For the reasons set forth above, Claim 27 is submitted to be patentable over Mourad et al.

Claim 28 depends from Claim 27. When the recitations of Claim 28 are considered in combination with the recitations of Claim 27, Applicants submit that dependent Claim 28 likewise is patentable over Mourad et al.

For at least the reasons set forth above, Applicants respectfully request that the Section 102 rejection of Claims 27 and 28 be withdrawn.

The rejection of Claims 27 and 28 under 35 U.S.C. § 103(a) as being unpatentable over Mourad et al. is respectfully traversed.

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Mourad et al. is described above.

Claim 27 recites a motor including "a housing; a stator mounted in said housing, said stator comprising a stator bore; a rotor rotatably mounted at least partially within said stator bore; and a processor electrically connected to at least one of said stator and said rotor, said processor configured to: determine a load voltage; and set an average speed of the motor by superimposing sweep frequencies onto an average pulse-width frequency, the average pulse-width frequency being a predetermined average of the sweep frequencies".

Mourad et al. does not describe or suggest a motor including a housing, a stator mounted in said housing, the stator including a stator bore, a rotor rotatably mounted at least partially within the stator bore, and a processor electrically connected to at least one of the stator and the rotor, the processor configured to determine a load voltage, and set an average speed of the motor by superimposing sweep frequencies onto an average pulse-width frequency, the average pulse-width frequency being a predetermined average of the sweep frequencies.

Moreover, Mourad et al. does not describe or suggest a motor including a processor configured to set an average speed of the motor by superimposing sweep frequencies onto an average pulse-width frequency, the average pulse-width frequency being a predetermined average of the sweep frequencies. Rather, Mourad et al. describe that the voltage V_0 has an average value equal to the difference between the voltage V_B delivered by the source and an electromotive force developed across the winding of the electric motor. For the reasons set forth above, Claim 27 is submitted to be patentable over Mourad et al.

Claim 28 depends from Claim 27. When the recitations of Claim 28 are considered in combination with the recitations of Claim 27, Applicants submit that dependent Claim 28 likewise is patentable over Mourad et al.

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For at least the reasons set forth above, Applicants respectfully request that the Section 103 rejection of Claims 27 and 28 be withdrawn.

The rejection of Claims 1, 2, 27, and 28 under 35 U.S.C. § 102(e) as being anticipated by Kobuzaka et al. (U.S. Patent 6,509,709 B2) is respectfully traversed.

Kobuzaka et al. describe a stepping motor controller. The stepping motor controller includes an excitation signal generator which receives input pulse signals and generates excitation signals for controlling an excitation sequence for a winding of a stepping motor (column 2, lines 44-57). The stepping motor controller also includes a switching circuit that receives the excitation signals and controls the excitation sequence for the winding of the stepping motor by a plurality of switching devices, a PWM constant current control circuit for controlling current flowing through the switching circuit to be a predetermined current set value, and a current sensor for detecting current flowing through the winding (column 2, lines 44-57). The stepping motor controller further includes a motor detector portion that includes a motor detector circuit that transmits a control signal for generating a constant current for a predetermined time for detecting the motor and includes a constant current generator that receives the control signal and generates the constant current to be supplied to the winding (column 2, line 60-column 3, line 6). The stepping motor controller also includes a reference voltage generator that generates a reference voltage, a voltage comparator circuit that compares the reference voltage with a voltage drop at the winding, and a current value setting signal generator circuit that transforms an output of the voltage comparator circuit into a current value setting signal for the PWM constant current control circuit (column 2, line 60-column 3, line 6). An output of the current value setting signal generator circuit is connected to a current value setting terminal of the PWM constant current control circuit (column 3, lines 7-10).

Claim 1 has been amended to include all the limitations of Claim 4, which is objected to as being dependent upon a rejected base claim, but is indicated as being allowable if rewritten in independent form including all the limitations of the base claim and any intervening claims. Claim 1 has been amended to include the limitations of the allowable Claim 4 and is therefore submitted to be in condition for allowance.

Claim 2 depends from independent Claim 1. When the recitations of Claim 2 are considered in combination with the recitations of Claim 1, Applicants submit that dependent Claim 2 likewise is patentable over Kobuzaka et al.

Claim 27 recites a motor including "a housing; a stator mounted in said housing, said stator comprising a stator bore; a rotor rotatably mounted at least partially within said stator bore; and a processor electrically connected to at least one of said stator and said rotor, said processor configured to determine a load voltage; and set an average speed of the motor by superimposing sweep frequencies onto an average pulse-width frequency, the average pulse-width frequency being a predetermined average of the sweep frequencies".

Kobuzaka et al. do not describe or suggest a motor including a housing, a stator mounted in said housing, the stator including a stator bore, a rotor rotatably mounted at least partially within the stator bore, and a processor electrically connected to at least one of the stator and the rotor, the processor configured to determine a load voltage, and set an average speed of the motor by superimposing sweep frequencies onto an average pulse-width frequency, the average pulse-width frequency being a predetermined average of the sweep frequencies.

Moreover, Kobuzaka et al. do not describe or suggest a motor including a processor configured to set an average speed of the motor by superimposing sweep frequencies onto an average pulse-width frequency, the average pulse-width frequency being a

predetermined average of the sweep frequencies. Rather, Kobuzaka et al. describe the current value setting signal generator circuit that transforms an output of the voltage comparator circuit into a current value setting signal for the PWM constant current control circuit. For the reasons set forth above, Claim 27 is submitted to be patentable over Kobuzaka et al.

Claim 28 depends from independent Claim 27. When the recitations of Claim 28 are considered in combination with the recitations of Claim 27, Applicants submit that Claim 28 likewise is patentable over Kobuzaka et al.

For at least the reasons set forth above, Applicants respectfully request that the Section 102 rejection of Claims 1, 2, 27, and 28 be withdrawn.

Claims 3-6, 29, and 52 are objected to as being dependent upon a rejected base claim, but are indicated as being allowable if rewritten in independent form including all the limitations of the base claim and any intervening claims.

Claim 3 has been amended to include the limitations of the base Claim 1 and is therefore submitted to be in condition for allowance.

Claim 4 has been canceled.

Claims 5 and 6 depend from Claim 3, which is submitted to be in condition for allowance. When the recitations of Claims 5 and 6 are considered in combination with the recitations of Claim 3, Applicants submit that dependent Claims 5 and 6 likewise are in condition for allowance.

Claim 29 depends indirectly from independent Claim 27, which is submitted to be in condition for allowance. When the recitations of Claim 29 are considered in combination with

the recitations of Claim 27, Applicants submit that dependent Claim 29 is also in condition for allowance.

Claim 52 depends from independent Claim 50, which is submitted to be in condition for allowance. When the recitations of Claim 52 are considered in combination with the recitations of Claim 50, Applicants submit that dependent Claim 52 is also in condition for allowance.

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In view of the foregoing amendments and remarks, all the claims now active in this application are believed to be in condition for allowance. Reconsideration and favorable action is respectfully solicited.

Respectfully Submitted,

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